EXHIBIT 4

UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF GEORGIA
GAINESVILLE DIVISION

Santana Bryson and Joshua Bryson, as Administrators of the Estate of C.Z.B., and as surviving Parents of C.Z.B., a deceased minor	*	
Plaintiffs,	*	**Civil Action File**
v.	*	**No. 2:22-cv-17-RWS**
Rough Country, LLC	*	
Defendant.	*	

DECLARATION OF LISA P. GWIN, D.O., B.S.E.E.

1. My name is LISA P. GWIN, D.O., B.S.E.E. I am over eighteen years old and of sound mind. I have never been convicted of a crime and am fully competent to make this declaration. I have personal knowledge of the facts stated herein, and they are true and correct to the best of my knowledge and belief.

2. I am a medically and engineering educated consultant of Biodynamic Research Corporation (BRC) and have been employed at BRC since 2012. My business address is 12810 West Golden Lane, San Antonio, Texas 78249.

3. The purpose of this declaration is to respond to **PLAINTIFFS' MOTION TO EXCLUDE CERTAIN OPINIONS OF DR. LISA GWIN UNDER RULE 702 AND DAUBERT** in the above-styled case.

4. Plaintiff does not question my Qualifications to provide expert testimony in this matter.

5. The Principles and Methodology of Injury Causation Analysis:

Overview. Injury Causation Analysis (ICA) is neither new nor novel. The methodology was not created by BRC and has been in existence since the middle of the last century. Injury Causation Analysis is the scientific method used to analyze the specific mechanism of injury for people who experience incidents in workplaces, transportation and other settings. ICA involves comparing the mechanical forces involved in the incident with the body's injury tolerance. Bio-mechanical engineering or biomechanics, a component of ICA, is the application of physics and mechanical engineering to the human body. The ancient Hebrews, Greeks and other early scientists understood and performed injury causation analysis (Mackay 2007). Like most

engineering and scientific subjects, impact biomechanics has evolved from early observations of natural phenomena, through an experimental period, to a theoretical framework which establishes general laws and precepts. Since 1687, Newton's three laws of motion have withstood the test of time to become the foundation of modern kinematics—the study of objects in motion. Academic institutions have established theoretical and practical courses in biomechanical engineering, injury causation and impact analysis. Researchers such as USAF Colonel John Paul Stapp used themselves as test subjects and published their findings. Others, such as Yamada, have published injury tolerance tables for individual body parts (McElhaney, Roberts, and Hilyard 1976; Yamada 1970). Eiband published similar work and developed corridors to delineate areas of expected safety and injury (Eiband 1959). Textbooks have been published which discuss the modern process of ICA (King 2018; Nahum 2002; McMeekin 1985).

The ICA process is a tool that can be used to accomplish different tasks. Primarily the ICA process has been used to understand events that harm or have the potential to harm people so that future harmful events may be avoided. It can also be used forensically to find the basis for a causal relationship between an incident and an injury.

A. <u>ICA as the Product of the Scientific Method.</u> Regardless of the indication to perform an ICA, the methods are similar and are adapted from the scientific process itself. The scientific method is the basis of most of our culture's technological advancement; its steps include:

- The statement of the problem
- The review of existing literature
- The generation of a hypothesis
- The testing of the hypothesis
- The collection and analysis of data from the test
- The final conclusion

As ICA is a specialized adaption of the scientific process, it follows a similar method:

- Statement of claimed interactions during subject event
- Review of the background facts, including the subject or occupant's motion
- Analysis of the subject's interaction with surroundings (biomechanics)
- Review of the existing literature to determine injury potential during the subject event
- Hypothesis testing by comparison of injuries found in the medical record and any relevant experimental testing and analysis
- Final conclusion

The first two steps use physics and commonly accepted techniques to understand the subject event. The application of biomechanics and the combination of engineering and biology determines human tissue loading. This leads to the next step of considering potential injuries expected from this loading. The last step compares expected injuries with those injuries documented in the medical records. Some of the procedural details vary to allow the analysis of events across the entire range of aerospace, automotive, industrial and other settings.

As most events follow commonly described patterns, the published scientific literature supports the process in both the investigation of the event as well as the pattern of injuries. Organizations such as the Society of Automotive Engineers, the Association for the Advancement of Automotive Medicine and the Aerospace Medical Association publish scientific articles describing the process and outcome of relevant scientific inquiry.

B. ICA's Potential Rates of Error. There is no error in the proper application of physical laws, i.e., gravity will always pull the apple toward the ground. When not applied correctly, errors are readily discoverable and demonstrable by those capable of performing a correct analysis. Similarly, errors in the interpretation of medical information can be corrected by careful and critical review. It must be noted that "rates of error" specifically relate to inquiries of a statistical or epidemiological nature, not specific inquiries, and generally have little to no applicability to applied sciences, e.g. 2+2=4, not 2+2=4±1.

C. ICA Subjected to Peer Review and Publication. The theory and techniques of ICA are longstanding (it is not a new or novel science) and have been and are subject to extensive peer review and publication in the numerous textbooks, journals and scientific and professional conference proceedings in which this subject has been and is presented. A list of publications citing the use and application of ICA is attached as Exhibit A and is incorporated by reference.

D. ICA's Acceptance / Application by Relevant Scientific Community. Broad evidence of the general acceptance of the theory and techniques of ICA in the scientific community exists. Practical application of the theory and techniques has been undertaken by government agencies including the Department of Defense, the Federal Aviation Administration (FAA), the National Transportation Safety Board (NTSB), the Centers for Disease Control and Prevention, the Occupational Safety and Health Administration (OSHA) and the National Highway Traffic Safety Administration (NHTSA) of the Department of Transportation. Incident investigation by United States government agencies such as the NTSB, FAA, OSHA and the US military services rely on ICA. The use of injury criteria and product design standards in Federal Motor Vehicle Safety Standards (FMVSS) are based on these theories and techniques. This includes all such standards applying to the design of vehicle seats, occupant restraint systems, and structural components of the passenger compartment.

NHTSA uses elements of ICA in its ongoing and systematic survey of fatal and non-fatal automobile accident data for inclusion in the National Automotive Sampling System (NASS) and the Fatality Analysis Reporting System (FARS) sponsored by the U.S. Government. The widespread use of computer programs such as EDCRASH, EDSMAC, HVE, MADYMO, and finite-element modeling systematically apply accident reconstruction theories and techniques in determining impact severity, vehicle dynamics and occupant kinematics. Techniques of ICA are widely endorsed and used by academic, industrial and government groups including, but by no means limited to, those previously mentioned, in order to advance the technology of vehicle occupant protection.

E. Non-judicial Uses of the ICA Methodology. ICA is, first and foremost, a process aimed at predicting and preventing injuries. ICA was developed to support the continuing efforts

of the scientific community to understand the nature of human traumatic injury and to devise methods of protection. ICA provides the fundamental method for the investigation of occupant injuries and fatalities. To prevent injuries through enhanced protection, NHTSA has used elements of ICA to learn the nature of occupant injury in motor vehicles. In response to this need, and at the request of the NHTSA, Engineering Dynamics Corporation developed computer-based software programs (EDCRASH and EDSMAC) that permit determination of the conditions of impact, including vehicle dynamics and occupant kinematics. The resulting statistical information has allowed determination of the nature of injuries so that redesign of safety equipment can lead to future increased protection, or prevention. Current extensive research sponsored by NHTSA on air bag technology is directly related to information derived from these efforts. The Crash Injury Research Engineering Network (CIREN) utilizes a multi-disciplinary approach based on ICA to draw conclusions about injury causation. ICA was used by former and current BRC consultants in the widely publicized NASCAR investigation into Mr. Dale Earnhardt's death while racing. Additionally, BRC was retained by the National Aeronautics and Space Administration (NASA) to examine injury causation mechanisms and crew survivability issues with regard to the loss of the Space Shuttle Columbia's breakup on re-entry over Texas.

The work of understanding injury causality has led to the remarkable evolution in safety. The process of ICA is commonly used to improve health and safety by enhancing primary and secondary prevention of injuries. Primary prevention avoids an injurious event and secondary prevention minimizes injury once an event occurs. Medical treatment constitutes tertiary prevention by healing injuries. Preventive measures can be implemented by eliminating hazards or applying engineering or administrative controls. The ICA process is routinely used to enhance safety, determine cause and perform other vital tasks to our society.

The ICA process leads to continuous improvements such as three-point restraints, driver airbags, side impact airbags and ongoing efforts that make our transportation, work and homes safer than ever before. The Air Force teaches the ICA process at its School of Aerospace Medicine as well as safety officer investigation courses. Occupational medicine and aerospace medicine are specialties within the American Board of Preventive Medicine. These specialties, which predate family practice and emergency medicine, teach and use ICA to prevent injuries and improve safety. Physicians supporting all industrial worksites use ICA to protect workers across America.

None of the publications listed in the Bibliography which appears at the end of this declaration was written for litigation matters. They were published in the scientific and technical domain to help provide a basis for eventual solutions to problems of injury.

F. <u>ICA Admissibility.</u> Used retrospectively, ICA can provide information relevant to judicial proceedings. Federal and State courts across the country have recognized the usefulness of testimony by experts with education, training, skills, and experience in the relevant disciplines of ICA to assist jurors in understanding the complex relationships between vehicle dynamics and clinical injury. BRC consultants, including myself, have testified at trial utilizing ICA in more than 1300 cases, in more than 700 Federal and State court jurisdictions, since the adoption in June 1993 of the *Daubert* criteria for the admissibility of scientific expert testimony. These

cases also include multiple occasions when such testimony has been provided in jurisdictions which retain *Frye* or similar criteria.

6. ***FRE 702 & Daubert***:

I am familiar with the standards for determining the admissibility of expert testimony in federal court.

My testimony should be found admissible under FRE 702 for the following reasons:

1) I am qualified to provide causation opinions regarding the Plaintiffs' injuries through my knowledge, skill, experience, training, and education;

2) My specialized scientific knowledge is relevant, as it will assist the trier of fact understand the evidence in this matter;

3) My testimony is based on sufficient facts and data, namely the facts and data in this matter, including those upon which Plaintiffs rely in making their claims;

4) My testimony is the result of my analysis in this matter which utilizes reliable scientific principles and methods; and

5) I have reliably applied these scientific principles and methods to the facts of this case.

To the extent my opinions are amenable to the reliability inquiry of *Daubert*, my testimony should be found admissible for satisfying the non-exclusive factors identified in *Daubert***,** as set forth in section 5, above. To summarize, my opinions satisfy *Daubert*, specifically as it relates to ICA, for the following reasons:

1) Injury Causation Analysis has a long and well-established history, developed through application of the scientific method, which has been tested and validated and applied to the ongoing development of safety and injury prevention technologies. Injury Causation Analysis involves the objective application of gathered data and further application of those forces to the immutable laws of physics, which are not subjective evaluations;

2) Injury Causation Analysis has a long and well-established history and is the subject of numerous peer-reviewed publications, as set forth in Section 5, above, including those publications cited in the bibliography at the end of this declaration;

3) Injury Causation Analysis is not subject to a particular rate of error where it is not performing statistical or epidemiological analyses, as "rates of error" specifically relate to inquiries of a statistical nature, and generally have little to no applicability to applied sciences;

4) Injury Causation Analysis is accepted as valid by the relevant scientific community, as evidenced by its incorporation into the curricula of Aerospace and Occupational Medicine, the innumerable peer-reviewed publications on its methodologies, and industry and governmental reliance on its application in the development of safety and injury prevention technologies; and

5) Injury Causation Analysis was not developed and is not primarily used for judicial use, but rather for the development of safety and injury prevention technologies, e.g., the analysis of the Space Shuttle Columbia disaster and Dale Earnhart's crash fatality for the purposes of designing measures to avoid such tragedies in the future.

ADDRESSING SPECIFIC COMPLAINTS RAISED BY PLAINTIFF'S MOTION:

7. Plaintiffs do not complain that I am not qualified or exceeding the scope of my knowledge and expertise. Nonetheless, I would note that my qualifications are set forth in my CV.

8. Plaintiffs claim that the sole support for my opinions are my characterization of the Exponent crash test as "violent." This is incorrect and ignores my Report dated March 29, 2024 and its cited factual and literature support in this matter. The case-specific facts referenced in my Report which support my opinions include the following:

- Master Cohen Bryson was sleeping, leaning to his right prior to the subject crash. His position placed the right side of his head near the head restraint adjustment knob of his child safety seat.

- The striking pick-up truck impacted the Bryon's Escape at approximately 50 mph, then overrode the bumper structure of the Bryson Escape, causing deformation of the rear structures of the Escape.

- There was cargo in the cargo area of the Bryson's Escape which was damaged by the crash, to include the spare tire and wheel assembly, camping chairs, a toy truck, and a shop vac. Neither Mr. not Mrs. Bryson could remember exactly what was in the cargo area, nor the placement of the cargo.

- After the striking pick-up damaged the rear structures of the Escape and smashed the cargo in the cargo area, the row 2 seat where Master Bryson was seated was shoved forward, more at the top of the seat back than the bottom. A polymer seat belt guide positioned on the seat back in the area of the right rear of the child seat was stress whitened and deformed.

- This vehicle seat deformation caused the child safety seat to be damaged and rotated forward, also more at the top of the child seat than at the bottom. Documented permanent damage to the child seat included stress whitening indicative of bending of the polymer child seat shell, as well as buckling of the child seat shell near the right head restraint adjustment knob. This head restraint adjustment knob was already near Master Bryson's right ear when he was leaned to his right and sleeping.

- Master Bryson's injuries included: bruising and abrasions of the right ear and abrasions behind the right ear; scalp bruising in the right temple area; hemorrhage of the muscle underlying the right temporal scalp; right depressed skull fracture emanating from the right temple area, and continuing across the base of the skull to the foramen magnum; subarachnoid hemorrhage of the brain base; dissociation of the skull base from the cervical spine; brainstem laceration; right eyelid bruising and swelling; left forearm fracture; thigh bruising; left femur fracture; and right leg fractures. His brainstem laceration was his fatal injury.

- I concluded from my analysis of the foregoing documented evidence that Master Bryson's fatal injuries were the result of the striking pick-up impacting the Bryson's Escape at approximately 50 mph, shoving the rear structures forward, crushing the cargo in the cargo area, then pushing the row 2 seat back forward. The rotation of the row 2 seat back (the top of the seat back moving more than the bottom of the seat back) caused the properly anchored child safety seat to also be rotated forward (top greater than bottom since it was anchored to the vehicle at the bottom). The seat belt guide on the row 2 seat back interacted with the child seat, damaging the belt guide. The child safety seat was twisted and bent, resulting in the documented stress whitening and buckling. This documented deformation of the child seat brought the area of the right head restraint adjustment knob down into position to contact Master Bryson's right ear and temple; I have not alleged that Master Bryson ramped up and over the top of the child seat, as Plaintiffs incorrectly claim.

These documented and case-specific facts which support my analysis and the conclusions I have set forth in my Report are clearly not a mere characterization of a crash as "violent."

9. Plaintiffs claim that the Exponent crash test was scientifically invalid, and therefore, my conclusions resulting from that crash test are unreliable. This is incorrect. In following the ICA methodology, and in order to test our hypothesis that the crash would be similar, even if the pick-up was not equipped with a lift kit, Mr. Grimes and I designed a crash test which was performed at Exponent in Phoenix, Arizona on May 15, 2023. Since the Brysons, the two people who would have the best chance at remembering what was in the cargo area of their vehicle and the location of those items, did not have recollection, we decided not to speculate at the contents or location of the items in the crash test vehicle. Despite that, the row 2 seat back was deformed forward in the crash test vehicle due to interaction with the lift gate of the Escape. We can therefore conclude that the presence of cargo would likely have resulted in more deformation than was seen in the crash test.

10. Plaintiffs claim that the choice to not include a "crash test dummy" in the row 2 left side position rendered the crash test unreliable. I made the decision not to include an exemplar child safety seat and child crash test dummy because, contrary to Plaintiffs' assertion that a child crash test dummy could be modified to match Master Bryson's height and weight, there is no dummy available or adaptable to accurately match Master Bryson's height and weight on the date of the subject crash. Master Bryson was 34.3 inches tall and weighed 28 pounds. The 3-year-old dummy has a height of 37.4 inches and a weight of 25.6 pounds. While adult dummies' heights and weights can sometimes be adjusted, there is no such capability in child dummies. While a child dummy could be ballasted to more closely match Master Bryson's weight, there would still be no way to decrease the height of the dummy by more than 3 inches.

11. Plaintiffs claim that I "eyeballed" the crash test videos to determine that the crash test with a stock suspension (no lift kit) was similar to the subject crash involving the lifted pick-up. That is incorrect. I participated in designing the test, observed the crash test live, inspected the vehicles post-test, and reviewed the crash test videos and photographs. I did characterize the crash test as "violent;" however, this was merely a descriptive term, nothing more, and this description of my observation of the event again was not my support for performing my analysis in this matter. I also went on to state that the row 2 seat back motion was very fast and involved a lot of forward movement, resulting in the pick-up and rear structure being pushed right into the back of Master Bryson (Gwin Deposition: Page 19, Lines 9 – 14).

12. Plaintiffs complain that my analysis is invalid because I did not take specific measurements of the deformation resulting from the crash test. This is incorrect and misleading. As seen in the crash test videos and post-test photographs, the row 2 seat was deformed forward similar to the deformation in the subject vehicle. There are several reasons that taking measurements would be immaterial. First, in any crash, dynamic motion is greater than the residual static motion, which means any measurement taken would under-report the deformation. Second, we did not have cargo in the cargo area for the reason detailed above; the motion of the row 2 seat would likely have been even greater than seen in the post-test photographs, which means that again, we would be under-reporting the deformation. Finally, there is not a particular threshold amount of forward motion of the row 2 seat that would or would not result in Master Bryson's fatal injury. What is important is the fact that a pick-up, with or without a lift kit, impacting the Bryson's Escape at approximately 50 mph shoved the lift gate of the Escape forward, crushed the cargo area with or without contents, and pushed the row 2 seat and the child safety seat forward, deforming the anchored child seat so that the head restraint adjustment knob made forceful contact with Master Bryson's head in the area of his right ear.

13. Plaintiffs claim that I have admitted that Master Bryson contacted the front-row seat in front of him, and therefore, my dismissal of that contact as a possible cause of death is flawed. This is misleading at best. While Plaintiffs point to my deposition in this matter, they do not

provide the context nor the entirety of my testimony. When asked how I determined "the front row driver's seat was not held up by the [child] car seat," I noted that "we know that based on his injuries…his **extremities** interacted with the driver's seat…and therefore the driver's seat would not reach the child safety seat." (Gwin Deposition: Page 52, Line 20 through Page 53, Line 2) While his arms and legs contacted the driver's seat back, his restrained torso and head would not have been able to reach the driver's seat back. Master Bryson's right temporal skull fracture and other skull, brain, and neck injuries, the cause of his death, were therefore not caused by his head contacting the back of the driver's seat.

It is notable that the Forensic Pathologist who performed Master Bryson's autopsy, Dr. Jonathan Eisenstat, confirmed that the skull, brain, and neck injuries were caused by a blunt impact to the child's right temple area, specifically to the right ear.

14. In summary, I have provided testimony in state and federal cases in Alabama, California, Colorado, Florida, Georgia, Iowa, Kentucky, Michigan, Missouri, Montana, New Mexico, New Jersey, Ohio, Oklahoma, Texas, Virginia, West Virginia, Wisconsin, and Wyoming as an expert, providing biomechanic, accident reconstruction, occupant kinematics, and medical opinions utilizing the ICA methodology. I am qualified by my education, skills, training, and experience to undertake an ICA, and I have appropriately employed a reliable and accepted methodology to reach my expert opinions which are summarized by my Report and sworn testimony in this matter.

15. I declare under penalty of perjury, that the foregoing is true and correct.

FURTHER AFFIANT SAITH NAUGHT.

Lisa P Gwo

03/17/2025

Lisa P. Gwin, DO
Biodynamic Research Corporation
12810 West Golden Lane
San Antonio, Texas 78249

Date

EXHIBIT A

REFERENCES

1. *Webster's Third New International Dictionary*, ed PB Gove. 1993, Springfield: Merriam-Webster Inc.

2. *The New Shorter OxEscape English Dictionary*, ed L Brown. 1993, OxEscape: Clarendon Press, p1728.

3. *The Concise OxEscape Dictionary of Current English*, ed J Sykes. 1976, OxEscape: Clarendon Press, p677-678.

4. American Medical Association. *Guides to the evaluation of permanent impairment.* 4th Edition, Chicago, 1993.

5. American Medical Association. *Guides to the evaluation of permanent impairment.* 5th Edition, Chicago, 2001.

6. American Medical Association. *Guides to the evaluation of permanent impairment.* 6th Edition, Chicago, 2008.

7. American Medical Association. *Guides to the evaluation of disease and injury causation.* Melhorn JM and Ackerman WA, eds. Chicago, 2008.

8. Neale J and Liebert R. *Science and Behaviour: An Introduction to Methods of Research*. 1973, Englewood Cliff: Prentice-Hall, p2.

9. *Biomechanics in Ergonomics*, ed S Kumar. 1999, London: Taylor and Francis. p3-5.

10. *Stedman's Medical Dictionary*. 28th Ed. 2006, Baltimore: Lippincott, Williams and Wilkins.

11. Manoogian SJ; Funk JR; Cormier JM; Bain CE; Guzman H, and Bonugli E. Evaluation of Thoracic and Lumbar Accelerations of Volunteers in Vertical and Horizontal Loading Scenarios. Society of Automotive Engineers, Warrendale, PA. 2010; 2010-01-0146.

12. Ng TP; Bussone WP; Dumas SF, and Kress TA. Thoracic and Lumbar Spine Accelerations in Everyday Activities. *Rocky Mountain Bioengineering Symposium & ISA Biomedical Sciences Instrumentation Symposium.* 2006; **42**: 410-415.

BIBLIOGRAPHY

DeHaven, H. 1942. “Mechanical Analysis of Survival in Falls from Heights of Fifty to One Hundred and Fifty Feet.” Cornell Medical College, New York.

Eiband, M. 1959. “Human Tolerance to Rapidly Applied Accelerations A Summary of the Literature.” NASA.

Fricke, L. 2010. *Traffic Crash Reconstruction*. Evanston, IL: Northwestern University Center for Public Safety.

King, A. 2018. *The Biomechanics of Impact Injury*. Cham: Springer International Publishing. https://doi.org/10.1007/978-3-319-49792-1.

Mackay, Murray. 2007. “The Increasing Importance of the Biomechanics of Impact Trauma.” *Sadhana* 32 (4): 397–408.

McElhaney, J., V. Roberts, and J. Hilyard. 1976. *Handbook of Human Tolerance*. Japanese Automobile Research Institute.

McMeekin, R. 1985. “Aircraft Accident Investigation.” In *Fundamentals of Aerospace Medicine*, 762–814. DeHart, R. Ed. Philadelphia.

Melhorn, J; Talmage, J; Ackerman, W; Hyman, M. 2014. *AMA Guides to the Evaluation of Disease and Injury Causation*. Second Edition. American Medical Association.

Nahum, Alan. 2002. *Accidental Injury, Biomechanics and Prevention*. 2nd ed. New York: Springer.

Rondinelli, R. 2008. *Guides to the Evaluation of Permanent Impairment*. 6th edition. Chicago, IL: American Medical Association.

Scott, W. R., C. Bain, S. J. Manoogian, J. M. Cormier, and J. R. Funk. 2010. “Simulation Model for Low-Speed Bumper-to-Bumper Crashes.” *SAE International Journal of Passenger Cars-Mechanical Systems* 3 (2010-01–0051): 21–36.

Yamada, H. 1970. *Strength of Biological Materials*. Baltimore, MD: Williams and Wilkins.

Injury Causation Analysis

Ambrosio JAC; Abramowicz W; Jones N, and King A. Crashworthiness of transportation

systems: Current issues and future trends. Ambrosio JAC; Seabra Pereira MFO, and da Silva FP, eds. IN: *Crashworthiness of transportation systems: Structural impact and occupant protection (No. 322)*. Boston: Kluwer Academic; 1997; pp. 615-624.

Arbelaez RA and O'Niell B. Difficulties in determining the cause of real-world crash injuries: A case study of a NASS investigation. *17th International Technical Conference on the Enhanced Safety of Vehicles (ESV)* - Amsterdam, The Netherlands, June 4 - 7. 2001.

Arbogast KB; Balasubramanian S; Seacrist T; Maltese MR; Garcia-Espana JF; Hopely T; Constans E; Lopez-Valdex FJ; Kent RW; Tanji H, and Higuchi K. Comparison of kinematic responses of the head and spine for children and adults in low-speed frontal sled tests. *Stapp Car Crash Journal* (P-404). SAE #2009-22-0012. 2009:329-372.

Arbogast KB; Kent RW; Menon RA; Ghati Y Durbin DR; Rouhana , and SW. Mechanisms of abdominal organ injury in seat belt-restrained children. *J Trauma*. 2007; 62(6):1473-1480.

Ardoino PL. Car crash and safety testing. Ambrosio JAC; Seabra Pereira MFO, and da Silva FP, eds. IN: *Crashworthiness of transportation systems: Structural impact and occupant protection (No. 322)*. Boston: Kluwer Academic; 1997; pp. 189-205.

Arregui-Dalmases C; Teijeira R, and Forman J. Injury biomechanics as a necessary tool in the field of forensic science: A pedestrian run-over case study. *Forensic Sci Int*. 2010; 198(1-3):E5-E9.

Banks, R.D.; Harding, R.; Smith, H. Assessing injury potential in rear-end automotive vehicle collisions. In: Yoganendan, N; Pintar, FA, eds. *Frontiers in Whiplash Trauma: Clinical and Biomechanical.* IOS Press, The Netherlands: 2000, 25-40.

Brenner R and Mosher WW. The use of mass, non-specific accident data in research. *Proceedings of the American Association for Automotive Medicine*. 1963:189-206.

Careme LM. Collision dynamics and injury causation in motorcycle accidents. *Rider-Passenger Protection in Motorcycle Collision* (SP-827). Warrendale, PA, Society of Automotive Engineers. SAE #900745. 1990:23-36.

Careme LM. Occupant kinematics and injury causation in side impacts: Field accident experience. *Side Impact Occupant Protection Technologies* (SP-851). Warrendale, PA, Society of Automotive Engineers. SAE #910316. 1991:1-15.

Compton CP. The use of public crash data in biomechanical research. Nahum AM and Melvin JW. IN: *Accidental Injury: Biomechanics and Prevention*. New York, NY: Springer-Verlag; 2002; pp. 41-71.

Cooper GJ, Dudley HAF, Gann DS, *et al*, eds. Scientific Foundations of Trauma. OxEscape, Butterworth-Heinemann, 1997.

Digges KH; Bedewi PG; Bahouth GT; Bedewi NE; Augenstein J; Perdeck E, and Stratton J. Determination and modeling of ankle injury causation. *Proceedings of the International Conference on Pelvis and Lower Extremity Injuries*, Washington, D.C., December . 1995:1-14.

Fung YC. The application of biomechanics to the understanding and analysis of trauma. Nahum AM and Melvin J, eds. IN: *The Biomechanics of Trauma*. Norwalk, CT: Appleton-Century-Crofts; 1985; pp. 1-16.

Gilchrist MD, ed. IUTAM Symposium on Impact Biomechanics: From Fundamental Insights to Applications. Netherlands: Springer; 2005.

Goldsmith W and Plunkett J. A biomechanical analysis of the causes of traumatic brain injury in infants and children. *Am J Forensic Med Pathol*. 2004; 25(2):89-100.

Gurdjian ES; Lange WA; Patrick LM and Thomas LM. Impact Injury and Crash Protection. Springfield, IL: Charles C Thomas; 1970.

Hayes WC; Erickson MS, and Power ED. Forensic injury biomechanics. *Annu Rev Biomed Eng*. 2007; 9:18.1-18.32.

Hill IR. Forensic analysis and data for road users. Ambrosio JAC; Seabra Pereira MFO, and da Silva FP, eds. IN: *Crashworthiness of transportation systems: Structural impact and occupant protection (No. 322)*. Boston: Kluwer Academic; 1997; pp. 95-111.

Huelke DF; Marsh JC; DiMento L; Sherman HW, and Ballard WJ, Jr. Injury causation in rollover accidents. *Proceedings of the 17th Annual Conference of the American Association for Automotive Medicine*, Oklahoma City, OK, November 14-17. SAE #1973-12-0007. 1973:87-115.

Kent RW; Forman JL, and Bostrom O. Is there really a "cushion effect"?: A biomechanical investigation of crash injury mechanisms in the obese. *Obesity*. 2009; 18(4):749-753.

King WF and Mertz HJ, eds. Human Impact Response: Measurement and Simulation. Proceedings of the Symposium on Human Impact Response held at the General Motors Research Laboratories, Warren,MI, October 2-3. New York, NY: Plenum Press; 1973.

Lissner HR. The response of the human body to impact. *Proceedings of Biomechanics and Related Bio-Engineering Topics*. 1965:135-139.

MacKay M. A review of the biomechanics of impacts in road accidents. Ambrosio JAC; Seabra Pereira MFO, and da Silva FP, eds. IN: *Crashworthiness of transportation systems: Structural impact and occupant protection (No. 322)*. Boston: Kluwer Academic; 1997; pp. 115-138.

Maltese MR; Locey CM; Jermakian JS; Nance ML, and Arbogast KB. Injury causation scenarios in belt-restrained nearside child occupants. *Proceedings of the 51st Stapp Car*

Crash Conference (P-401). SAE #2007-22-0013. 2007:299-311.

Marsh JC, IV . Existing traffic accident injury causation data recording methods and the proposal of accident injury classification scheme. *Proceedings of the 17th Annual Conference of the American Association for Automotive Medicine*, Oklahoma City, OK, November 14-17. 1973:44-61.

Mason, JK, Reals JW, eds. Aerospace Pathology. Chicago, Illinois: College of American Pathologists Foundation, 1973.

McElhaney JH; Roberts VL, and Hilyard JF. Handbook of Human Tolerance. Tokyo, Japan: Japan Automobile Research Institute, Inc.; 1976.

McHenry RR. Analysis of the dynamics of automobile passenger-restraint systems. *Proceedings of the American Association for Automotive Medicine*. 1963:207-249.

McKenzie K; Enraght-Moony E; Harding L; Walker S; Waller G, and Chen L. Coding external causes of injuries: Problems and solutions. *Accid Anal Prev*. 2008; 40:714-718.

McLay RW; Molloy MK, and Anderson D. Human factors, injury causation, and animation. *Accident Reconstruction: Technology and Animation III* (SP-946). Warrendale, PA, Society of Automotive Engineers. SAE #930902. 1993:267-272.

Melhorn JM, Ackerman WA, eds. Guides to the evaluation of disease and injury causation. Chicago, American Medical Association, 2008.

Mertz HJ. Injury risk assessments based on dummy responses. Nahum, Alan M and Melvin, John W eds. IN: *Accidental Injury. Biomechanics and Prevention*, 2nd ed. New York: Springer; 2002; pp. 89-102.

Nahum AM; Siegel AW, and Trachtenberg SB. Causes of significant injuries in nonfatal traffic accidents. *Proceedings of the 10th Stapp Car Crash Conference*. New York, NY, Society of Automotive Engineers. SAE #660803. 1966:295-313.

Nahum AM and Gomez MA. Injury reconstruction: the biomechanical analysis of accidental injury. Warrendale, PA, Society of Automotive Engineers, SAE#940568. 1994.

Otte D and Huefner T. Relevance on injury causation of vehicle parts in car to pedestrian impacts in different accident configurations of the traffic scenario and aspects of accident avoidance and injury prevention. *20th International Technical Conference on the Enhanced Safety of Vehicles Conference* (ESV). June 18-21, Lyon, France. 2007.

Patrick LM and Andersson A. Three-point harness accident and laboratory data comparison. *Proceedings of the 18th Stapp Car Crash Conference* (P-56). Warrendale, PA, Society of Automotive Engineers. SAE #741181. 1974:201-282.

Perper JA and Wecht CH. Medical-legal problems in determining cause of death in motor

vehicle accidents. *Proceedings of the 18th Annual Conference of the American Association for Automotive Medicine*, Toronto, ON, Canada, September 12-14. 1974:200-207.

Perper JA and Wecht CH. Medicolegal problems in determining cause of death in motor vehicle accidents. *Forensic Sci*. 1975; 6:241-247.

Pike JA. Forensic Biomechanics. Warrendale, PA, Society of Automotive Engineers, 2008.

Radun I; Ohisalo J; Radun JE; Summala H, and Tolvanen M. Fell asleep and caused a fatal head-on crash? A case study of multidisciplinary in-depth analysis vs. the court. *Traffic Inj Prev*. 2009; 10:76-83.

Ranney TA. Accident characteristics and injury causation in accidents involving light trucks, vans, and utility vehicles. *Proceedings of the 25th Annual Conference of the American Association for Automotive Medicine*, San Francisco, CA, October 1-3. SAE #1981-12-0006. 1981:57-68.

Ryan GA. Injuries in urban and rural traffic accidents: a comparison of two studies. *Proceedings of the 11th Stapp Car Crash Conference* (P-20). New York, NY, Society of Automotive Engineers. SAE #670926. 1967:479-488.

Ryan GA. A study of seat belts and injuries. *Proceedings of the 17th Stapp Car Crash Conference* (P-51). New York, NY, Society of Automotive Engineers. 1973:67-78.

Ryb GE; Dischinger PC, and Ho S. Causation and outcomes of diaphramatic injuries in vehicular crashes [poster]. *53rd Annual Conference Annals of Advances in Automotive Medicine*, Oct. 5-7, Baltimore, Maryland. 2009.

Schmitt K-U; Niederer PF, and Walz F. Methods in trauma biomechanics. Schmitt K-U; Niederer PF, and Walz F. IN: *Trauma Biomechanics. Introduction to Accidental Injury*. Berlin: Springer; 2004; pp. 1-37.

Schneider H and Beier G. Experiment and accident: Comparison of dummy test results and real pedestrian accidents. *Proceedings of the 18th Stapp Car Crash Conference* (P-56), Ann Arbor, MI, December 4-5. Warrendale, PA, Society of Automotive Engineers. SAE #741177. 1974:29-69.

Sherwood C; O'Neill B, and Hurwitz S. Lower extremity injury causation in frontal crashes. *Proceedings of the 1999 International IRCOBI Conference on the Biomechanics of Impact*, Sitges, Spain, Sept. Bron, France, IRCOBI Secretariat. SAE #1999-13-0036. 1999:513-526.

Stacey S and Kent R. Investigation of an alleged mechanism of finger injury in an automobile crash. *Int J Leg Med*. 2006; 120(4):246-251.

Stapp JP. Review of Air Force research on biodynamics of collision injury. *10th Stapp*

Crash Conference. Holloman AFB, NM. SAE #660805. 1966:204-210.

Thomas P; BradEscape M; Charles J, and Fay P. Lower extremity injuries and their causation in frontal car crashes: Real-world accident data collection. *International Conference on Pelvic and Lower Extremity Injuries Proceedings*. Dec 4-6, Washington, DC. 1995:15-24.

van Rooij L and van Hoof J. The utility of multi-body modeling for crash reconstruction and medical assessment of injury causation. *Association for the Advancement of Automotive Medicine 46th Annual Proceedings*. Tempe, AZ, September 30-October 2, 2002. 2002:341-346.

Whiting WC and Zernicke RF. Biomechanics of Musculoskeletal Injury, 2nd ed. Champaign, IL: *Human Kinetics*; 1998.

Young D; Grzebieta R; McIntosh A; Bambach M, and Frechede B. Diving versus roof intrusion: A review of rollover injury causation. *Int J Crashworthiness*. 2007; 12(6):606-628.

Yamada, Hiroshi. Strength of Biological Materials. Baltimore, MD: Williams & Wilkins; 1970.

Mechanics – Dynamics and Kinematics

Beer FP and Johnston ER. Mechanics of Materials. 2nd Ed. New York, McGraw-Hill, 1992.

Young WC. Roark's Formulas for Stress & Strain. 6th Ed. New York, McGraw-Hill, 1989.

Riley WF and Sturges LD, Engineering Mechanics – Dynamics. 2nd Ed. New York, John Wiley & Sons, 1996.

Vehicle Dynamics and Impact Analysis

Fricke LB. *Traffic Accident Reconstruction. 2ND Ed.* Evanston, IL, Northwestern University Center for Public Safety, 2010.

Cipriani AL, Bayan FP, Woodhouse ML, *et al. Low speed collinear impact severity: a comparison between full scale testing and analytical prediction tools with restitution analysis*. SAE Paper 2002-01-0540.

Happer AJ, Hughes MC, Peck MD, Boehme SM. *Practical analysis methodology for low speed vehicle collisions involving vehicles with modern bumper systems*. SAE Paper 2003-01-0492.

Kalthoff W. *European accident reconstruction by the visual comparison of crash tests.* Collision. 2008; **2**(2): 92-97.

Bready J, Nordhagen R, Perl T, James M. *Methods of Occupant Kinematics Analysis in Automobile Crashes*. SAE Paper 2002-01-0536.

Biomechanics

Kumar, S. Biomechanics in Ergonomics. Philadelphia, PA: Taylor & Francis, 1999.

Nahum, AM and Melvin JW, eds. Accidental Injury: Biomechanics and Prevention. 2nd Ed. New York: Springer, 2002.

White AA and Panjabi MM, eds. Clinical Biomechanics of the Spine. 2nd Ed. Philadelphia, JB Lippincott, 1990.

Whiting WC and Zernicke RF. Biomechanics of Musculoskeletal Injury, 2nd Ed. Champaign, IL, Human Kinetics, (2009).

Foster JK, Kortge JO, and Wolanin MJ. Hybrid III – A Biomechanically-Based Crash Test Dummy. Warrendale, PA, Society of Automotive Engineer. SAE#770938. 1977.

McElhaney JH, Roberts VL, and Hilyard JF. Handbook of Human Tolerance. Tokyo, Japan Automobile Research Institute, 1976.

Literature cited in my Report in this matter

Abraham MK, Bond MC. Femur and Hip. In Rosen's Emergency Medicine: Concepts and Clinical Practice. 9th Edition. Philadelphia: Elsevier, 2018. Pp. 593-613.

Bilo RAC, Robben SGF, van Rijn RR. Head. In Forensic Aspects of Paediatric Fractures: Differentiating Accidental Trauma from Child Abuse. 2010. Springer: Heidelberg, Germany. Pp. 15-47.

Britt RH; Herrick MK; Mason RT, and Dorfman LJ. Traumatic lesions of the pontomedullary junction. Neurosurgery. 1980; 6(6):623-631.

Courtney C. Hip and Femur Injuries. In Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 9th Edition. New York: McGraw-Hill, 2020. Pp. 1842-50.

Dundamadappa, S. K., Thangasamy, S., Resteghini, N., Vedantham, S., Chen, A., & Takhtani, D. (2015). Skull fractures in pediatric patients on computerized tomogram: comparison between routing bone window images and 3D volume-rendered images. Emergency radiology, 22, 367-372.

Fricke, Lynn. (2010). Traffic Crash Reconstruction (2nd ed). Evanston, IL: Northwestern University Center for Public Safety.

Go S. Spine Trauma. In Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 9th Edition. New York: McGraw-Hill, 2020. Pp. 1696-1714.

Isa, M. I., Fenton, T. W., Goots, A. C., Watson, E. O., Vaughan, P. E., & Wei, F. (2019). Experimental investigation of cranial fracture initiation in blunt human head impacts. Forensic science international, 300, 51-62.

James, M. B., Strother, C. E., Warner, C. Y., Decker, R. L., & Perl, T. R. (1991). Occupant protection in rear-end collisions: I. safety priorities and seat belt effectiveness (No. 912913). SAE Technical Paper.

Kaji AH, Hockberger RS. Spinal Injuries. In Rosen's Emergency Medicine: Concepts and Clinical Practice. 9th Edition. Philadelphia: Elsevier, 2018. Pp. 345-71.

Kondo T; Saito K; Nishigami J, and Ohshima T. Fatal injuries of the brain stem and/or upper cervical spine cord in traffic accidents: Nine autopsy cases. Sci Justice. 1995; 35(3):197-201.

Loyd, Andre M., Chris Van Ee, Matthew B. Panzer, Barry S. Myers, and Cameron R. Bass. "Skull biomechanics." Orthop. Biomech 121 (2012).

Chow YC, Lee SW. Elbow and Forearm Injuries. In Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 9th Edition. New York: McGraw-Hill, 2020. Pp. 1809-21.

Margulies, S. S., & Thibault, L. E. (1992). A proposed tolerance criterion for diffuse axonal injury in man. Journal of biomechanics, 25(8), 917-923.

McElhaney JH, Roberts VL, Hilyard JF. Head Injury Tolerance and Criteria. In Handbook of Human Tolerance. Japan Automobile Research Institute. 1976. Pp. 237-335.

McGuinness, R. B., Jalloh, I., & Macarthur, D. C. (2017). A cracking shot! depressed skull fracture sustained from a golf ball in a 16-year-old. British Journal of Neurosurgery, 31(5), 624-625.

Melvin JW, Yoganandan N. Biomechanics of Brain Injury: A Historic Perspective. In Yoganandan, N., Melvin, J. W., Nahum, A. M., & (Eds.). (2015). Accidental Injury: Biomechanics and Prevention. Springer New York. Pp. 221-45.

Nightingale, R, Myers, B, Yoganandan, N. Neck Injury Biomechanics. In Yoganandan, N., Melvin, J. W., Nahum, A. M., & (Eds.). (2015). Accidental Injury: Biomechanics and Prevention. Springer New York. Pp. 259-308.

Ohshima T and Kondo T. Forensic pathological observations on fatal injuries to the brain stem and/or upper cervical spinal cord in traffic accidents. J Clin Forensic Med. 1998; 5:129-134.

Pallin DJ. Knee and Lower Leg. In Rosen's Emergency Medicine: Concepts and Clinical Practice. 9th Edition. Philadelphia: Elsevier, 2018. Pp. 614-33.

Papa L, Goldberg SA. Head Trauma. In Rosen's Emergency Medicine: Concepts and Clinical Practice. 9th Edition. Philadelphia: Elsevier, 2018. Pp. 301-29.

Rupp JD. Knee, Thigh, and Hip Injury Biomechanics. In Yoganandan, N., Melvin, J. W., Nahum, A. M., & (Eds.). (2015). Accidental Injury: Biomechanics and Prevention. Springer New York. Pp. 471-98.

Salzar RS, Lievers WB, Bailey AM, Crandall JR. Leg, Foot, and Ankle Injury. In Yoganandan, N., Melvin, J. W., Nahum, A. M., & (Eds.). (2015). Accidental Injury: Biomechanics and Prevention. Springer New York. Pp. 499-548.

Spitz, W. U., & Diaz, F. J. (2020). Trauma of the Nervous System. In Spitz and Fisher's medicolegal investigation of death: guidelines for the application of pathology to crime investigation. Charles C Thomas, Ltd. Springfield, IL. Pp. 549-608.

Syed, O. N., Hankinson, T. C., Mack, W. J., Feldstein, N. A., & Anderson, R. C. (2008). Radiolucent hair accessories causing depressed skull fracture following blunt cranial trauma: Report of 2 cases. Journal of Neurosurgery: Pediatrics, 2(6), 424-426.

Thibault, L., Gennarelli, T., & Margulies, S. (1989). Animal, Physical and Analytical Models for Use in The Development of Improved Head Injury Criteria. Volume 1. Final Report (No. HS-807 481).

Vaughan, P. E., Vogelsberg, C. C., Vollner, J. M., Fenton, T. W., & Haut, R. C. (2016). The role of interface shape on the impact characteristics and cranial fracture patterns using the immature porcine head model. Journal of forensic sciences, 61(5), 1190-1197.

Viano, D. C. (2002). Role of the seat in rear crash safety. Warrendale, PA: Society of Automotive Engineers, 2002. 514. .

Viano, D. C. (2003). Influence of seat properties on occupant dynamics in severe rear crashes. Traffic injury prevention, 4(4), 324-336.

Wang M, Rao RD, Yoganandan N, Pintar F. Upper Extremity Injury Biomechanics. In Yoganandan, N., Melvin, J. W., Nahum, A. M., & (Eds.). (2015). Accidental Injury: Biomechanics and Prevention. Springer New York. Pp. 309-30.

Weiers AK, Haller P. Leg Injuries. In Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 9th Edition. New York: McGraw-Hill, 2020. Pp. 1859-62.

Williams DT, Kim HT. Wrist and Forearm. In Rosen's Emergency Medicine: Concepts and Clinical Practice. 9th Edition. Philadelphia: Elsevier, 2018. Pp. 508-29

Wright DW, Merck LH. Head Trauma. In Tintinalli's Emergency Medicine: A Comprehensive Study Guide. 9th Edition. New York: McGraw-Hill, 2020. Pp. 1683-95.

Young HD. Fundamentals of Mechanics and Heat. New York: McGraw-Hill; 1964.

Živković, V., Nikolić, S., Babić, D., & Juković, F. (2010). The significance of pontomedullary laceration in car occupants following frontal collisions: a retrospective autopsy study. Forensic science international, 202(1-3), 13-16.